Innovation in manufacturing for a new sustainable resource recycling process

Development of novel recycling processes for precious and rare metals

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Summary :

We will develop innovative and environmentally sound recycling processes for precious and rare metal scraps to establish new circulation systems and new business models for recycling those metals. During chemical processes of extracting and separating precious and rare metals in scraps, different metals in the scraps interact with each other. In order to separate and collect precious and rare metals in scraps at a low cost, multi-step hydrometallurgical processes are generally employed. During these processes, a large quantity of hazardous waste solution to be produced in many cases. Generally, the concentrations of precious metals and rare metals in scraps are low; hence, they are often not suitable for long-distance transportation. In this project, we will develop environmentally sound chemical processes to extract and separate precious and rare metals in scraps without generating hazardous waste, waste solution, exhaust gas, etc., by controlling the interaction between the metals in the scraps. By combining the new chemical processes with efficient physical sorting methods, we will develop new technologies to efficiently and quickly concentrate and separate precious and rare metals in scraps. We aim to build a new social system where the scraps containing highly concentrated precious and rare metals are shipped to Japan from all over the world and recycled in Japan.

https://www.okabe.iis.u-tokyo.ac.jp/

Development of new environmentally sound chemical processes for highly efficient recycling of precious and rare metals

Products

Smartphone, PC (Precious metals and rare metals)
Next Gen. Automobile (Running rare metals)
Next Gen. Airplane (Flying rare metals)
Next Gen. Robot (Moving rare metals)
Energy, Marine, Aerospace Industries, etc.

Precious metals & Rare metals

Materials **Resources**

Bottleneck

- Production of waste solution and exhaust gas
- High process cost
- Low-efficiency and long recycling process duration

Current status

- Processing overseas
- Limitation of recycling associated with decreasing concentration of precious metals and rare metals in scraps
- Impairment
- Severe environmental pollution via mining

Proposed solution

New chemical process
Waste free, high concentration, high speed

By combining the new chemical processes with efficient physical sorting methods, we will develop new recycling systems and their associated businesses for precious metals and rare metals.